The Argo Program in 2020 and beyond: Challenges and opportunities

Dean Roemmich, Susan Wijffels, Toshio Suga and the Argo Steering Team

The Argo array of freely drifting profiling floats monitors temperature and salinity of the upper 2000m of the global ocean on large spatial scales and on sub-seasonal to decadal time scales. With implementation having started in late 1999, it took the 20 contributing countries until 2007 to reach Argo's planned target of 1 float every 3 degrees in the deep, open, ice-free ocean. Since that time global coverage has been sustained at about 3800 floats for over a decade, leading to a wealth of new discoveries (3000 scientific publications) documenting the evolving state and variability of the ocean/climate system, underpinning improved ocean forecasting, and supporting all branches of marine science. Over this period, the technology used in Argo has advanced, allowing operations in previously difficult regions: closer to the sea surface, in marginal seas, in seasonal ice zones, and over the full ocean depth. In parallel, new requirements are emerging, such as enhanced sampling in the tropics and western boundary regions. Major planned Argo enhancements include full depth sampling (Deep Argo) and the addition of new sensors (Biogeochemical Argo). Combining these opportunities and requirements, a new global design for Argo is presented, extending the array’s coverage and increasing its sampling power in key areas. Argo's past accomplishments and lessons learned are reviewed, and the drivers of Argo’s revised design, as well as its benefits, are described. The overarching challenges of sustaining Argo are assessed.